A Systematic Approach To The Evaluation Of Acute Unexplained Crying In Infants In The Emergency Department

Abstract

Crying is a common behavior of infancy that can be a signal of a broad spectrum of conditions ranging from the normal needs of hunger and sleep to significant medical or surgical pathology. In the medical setting, crying is often seen in concert with other signs of disease or distress, such as fever, vomiting, rash, or trauma. However, challenges in evaluation of infants may arise when crying is the only sign. A thorough, systematic, and appropriate history and physical examination are needed. Additionally, a broad range of medical possibilities coupled with caregiver concern need to be considered to ensure proper evaluation. In this issue, we will review crying as a chief complaint in the emergency department setting and provide a systematic and practical approach to the evaluation of crying infants.

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CME Objectives

Upon completion of this article, you should be able to:
1. Identify and differentiate common and life-threatening etiologies of infant crying.
2. Define components of an ED evaluation proven to contribute to uncovering a diagnosis in a crying infant.
3. Demonstrate practical, cost-effective methods of evaluation and disposition to crying infants based on confirmed or unconfirmed underlying illness.

Prior to beginning this activity, see “Physician CME Information” on the back page.

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Introduction

Crying is the sole method of communication for infants. There is an extensive body of medical literature describing its physiology, progression, variations, and parental and caregiver responses. Crying can reflect that an infant’s basic needs (such as hunger, thirst, and the need for affection) are unmet, or it can represent significant distress (anger, discomfort, and pain).

While crying remains a well-studied phenomenon, the understanding and management of the crying infant continues to challenge parents and caregivers alike.

Parents often have an intuitive sense of why their babies are crying and can distinguish the cries of hunger, fatigue, and discomfort from one another and address those needs. When crying patterns deviate from the perceived “norm,” (ie, are seen as excessive or uncharacteristic) or when efforts to console a crying infant are exhausted, parents will often seek help from a healthcare provider. At that point, parents may be anxious, sleep-deprived, troubled, and in need of care and reassurance themselves.

Crying as a presenting complaint is one of the most common indications for parents to seek medical attention in the first 3 months of life. It is also a prevalent presentation for evaluation in the emergency department (ED). Studies have reported a percentage of all annual ED visits for infant crying ranging from 0.25% to 13.6%. Evaluating crying in preverbal patients and relating to their caregivers may be a significant challenge to emergency clinicians. Absence of fever, vomiting, respiratory distress, or other symptoms that more readily lend themselves to preestablished guidelines for evaluation and management augment the challenge.

Providers must determine a timely and cost-effective strategy for evaluating these infants.

This issue will present an updated systematic approach to management of the infant who presents with acute, unexplained crying in the ED setting. This article will review pertinent literature, relevant background information, the common and more serious diagnoses, and algorithms for evaluating, treating, and determining disposition for this group of patients.

Critical Appraisal Of The Literature

A search was performed in PubMed for articles published since 1960 pertaining to children aged < 2 years, using multiple combinations of the search terms including, but not limited to: infant crying, fussiness, inconsolability, and irritability. Search terms to qualify crying patterns were also used, including prolonged, excessive, normal, abnormal, acute, and dangerous. The Cochrane Database of Systematic Reviews was also consulted. Articles relevant to infant crying were

Case Presentations

Joseph is a 4-month-old boy whose parents bring him to the ED after 2 weeks of intermittent episodes of fussiness and crying that became more frequent and are now being described as “constant.” He was seen by his pediatrician earlier in the week and was started on oral ranitidine for presumed gastroesophageal reflux. However, the family feels this recent crying is not consistent with the pattern of crying that he exhibited prior to starting the antireflux medication. He has had no fever, vomiting, or diarrhea. He has been taking in a normal amount of liquids orally with a normal volume of urine output and 3 to 4 mustard yellow stools per day. The mother had an uncomplicated pregnancy and delivery. He was a full-term infant and has been growing well. He has no risk factors for sepsis. His physical examination is completely unremarkable, with normal vital signs for his age. He is well-appearing, calm, quiet, and in no distress during the initial history and examination. You consider the following: Could there be a connection between Joseph’s crying and the recent diagnosis of gastroesophageal reflux? Do the parents concerns about the change in their baby’s crying pattern affect your concern as a clinician? If the baby now appears well and is afebrile with a normal examination, is any further testing necessary at this time?

Melissa is a 10-week-old girl born by normal spontaneous vaginal delivery, at term, with no complications. She is brought to the ED by her mother with a chief complaint of being “inconsolable.” Per her mother’s report, she had been in her usual state of health until her 2-month well-child visit 3 days ago, when she received her scheduled vaccinations. She was slightly “fussy” after getting the vaccinations. She developed a low-grade temperature to 37.9°C that night, but slept well and, by the next morning, was afebrile. Yesterday, she was given a bath and a few hours later began to cry intermittently. Over the course of the following 24 hours, she became increasingly irritable and is now inconsolable. Her mother denies that her daughter has cough, rhinorrhea, rash, vomiting, diarrhea, decreased oral intake, or change in urine output, but she has had some difficulty sleeping over the past 24 hours. The mother states that she has 3 other children at home and does not have any support socially or financially, as the father of this baby is not currently involved. She admits to feeling overwhelmed. On initial examination, Melissa is intermittently crying, but consolable, and has no revealing findings. Vital signs are within normal limits other than some mild tachycardia that you attribute to her crying. The vaccination sites on her bilateral thighs are without induration or tenderness to palpation. Despite the unrevealing examination, you have a “gut feeling” that something is wrong with Melissa. You tell the mother that you will observe her in the ED and will return shortly to check her again. You consider the following: In the setting of recent vaccinations, could this be an adverse reaction, even 3 days after administration? What about this history is giving you such a bad gut feeling, and how should you integrate this concern into your evaluation, if at all?
selected and reviewed. Over 150 articles were reviewed, 70 of which were chosen for inclusion in this review, including a number of case reports, clinical reviews, and retrospective and prospective controlled studies. The challenge in evaluating the literature on crying is the variability in defining terms applicable to crying behaviors, the multitude of clinical settings, and the dearth of large, practice-changing studies. Crying is a complaint that is not unique to the ED; therefore, a comprehensive analysis of the literature must include a broader scope of pediatric studies in a variety of clinical settings. The underlying etiologies for infant crying are often nonemergent, or not initially recognized as emergent, so crying infants are often seen in primary care offices. Of the 70 articles chosen for this article, approximately 20 to 25 of the studies were conducted in the outpatient or primary care setting, 10 were conducted in the inpatient or hospital setting, and 20 in the ED setting. The remaining articles were large-scale reviews. The data from these studies and reviews inform the general approach to the care of crying infants, including those who present for their initial care in the ED.

One of the most referenced papers is a 1991 prospective study of 56 infants performed by Poole in the ED setting. The largest North American study published in 2009 by Freedman et al retrospectively reviewed 237 infants who presented to the ED with crying. While recent reviews and larger studies help guide management of the crying infant, it remains difficult to define a centralized body of literature as well as standardized treatment algorithms for evaluating these infants.

**Etiology And Epidemiology**

For emergency clinicians, it is important to understand the normal or expected patterns of infant crying in order to effectively evaluate excessive or abnormal crying. In Brazelton’s 1962 study on infant crying in the primary care setting, he found that, on average, infants aged < 12 weeks cried from 1 to 4 hours each day, with a peak at 6 to 8 weeks, and an improvement by approximately 10 weeks of age. Other studies have similarly documented these and other expected norms of crying at various stages of infant development to guide parents and clinicians.

Excessive crying, or crying more than what is normally expected for age, is difficult to quantify or define largely due to conflicting definitions in the medical literature. It has often been defined by parental perception, which is supported by data indicating that parents are knowledgeable about the different cries of their infants. Whether the crying is considered “normal” or “excessive,” it is a common presenting complaint to emergency clinicians as parents seek relief for their infants and themselves. Reported by more than 1 in 5 parents, crying is one of the most common complaints for which parents seek care in the first few months of life.

In 1991, Poole reported that, among the infants aged < 1 year presenting to a children’s ED with acute unexplained crying, 60% had a serious cause to explain their presentation. In that study, a “serious” diagnosis was one that was “…considered by at least 2 of a panel of 3 pediatricians (who were unaware of the study) to require prompt treatment or to have the potential to cause harm if not recognized or left untreated.” Poole’s inclusive definition of a serious diagnosis, which ranged from gingivostomatitis to meningitis, may have accounted for the high rate of patients labeled as having serious conditions. More reassuringly, Freedman et al reported that in their 2009 patient cohort study of crying infants presenting to the ED, only 5.1% had a serious underlying etiology for the crying. While in that study, a “serious” diagnosis was considered one that met definitions established prior to the study (and was then agreed to by a panel of 6 pediatricians) as diagnoses that could potentially result in an adverse outcome if undiagnosed. For the purpose of this article (based on the review of the evidence), we define “serious” illness as one that is life-threatening or could result in significant morbidity or mortality if undiagnosed or untreated in a timely or expeditious manner. The emergency clinician must integrate multiple etiologic and epidemiologic features into evaluation of a crying infant, keeping in mind that even a “normal” amount of crying may be distressing to certain caregivers, while appreciating the ability of parents to determine whether crying is abnormal for their infant.

**Differential Diagnosis**

The global differential diagnosis for crying as a chief complaint is extensive and involves every organ system. (See Table 1, page 4.) This comprehensive list would be difficult to consider for every crying infant who presents to the ED. The workup would be stress-inducing for parents and clinicians, costly, and, for most infants, unnecessary. What this broad list does serve to do, however, is remind providers that crying is not always a minor complaint, and that its presence can signal significant pathology. With acute crying, as with all clinical complaints, the role of the emergency clinician in evaluating a patient is 2-fold: (1) to avoid missing a serious or life-threatening etiology and (2) to determine the common/treatable diagnoses underlying a patient’s chief complaint.

**Life-Threatening Causes Of Crying**

As with all ED patients, the most likely critical causes for a patient’s presentation should be considered and addressed prior to contemplation of less-
likely pathology. These are the diagnoses generally considered to cause harm to the patient if undiagnosed or left untreated.

The most common serious underlying etiology for crying, especially in young infants, is urinary tract infection (UTI). UTIs have been reported as an underlying diagnosis for afebrile crying infants in multiple studies. In Freedman et al’s retrospective study of 237 crying infants, UTI was the most common underlying serious etiology for crying, especially in infants aged < 4 months. Other serious infections should also be considered. Presentation of fever in conjunction with fussy or irritable behavior will often prompt an extensive and appropriate workup for infection or sepsis, while crying without fever or other symptoms may not. In 1999, Ruiz-Contreras et al published a case series of 6 infants with sepsis in whom persistent crying was the predominant manifestation for 2 to 10 hours before the appearance of fever or other well-known symptoms of infection. Similarly, meningitis must be considered for any infant with crying that seems abnormal, persistent, or raises true concern of irritability and inconsolability. Serial examinations, with attention to fever curves, may increase the chances of identifying an evolving infectious process.

<table>
<thead>
<tr>
<th>Organ System</th>
<th>Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head, eyes, ears, nose, throat</td>
<td>*Trauma (skull fracture, hematoma)</td>
</tr>
<tr>
<td>Cardiac</td>
<td>*Dysrhythmias (supraventricular tachycardia)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>*Foreign body aspiration</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>*Small/large bowel obstruction</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>*Testicular/ovarian torsion</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>*Vaso-occlusive crises/dactylitis (sickle cell disease)</td>
</tr>
<tr>
<td>Dermatologic</td>
<td>*Burns</td>
</tr>
<tr>
<td>Neurologic</td>
<td>*Meningitis</td>
</tr>
<tr>
<td>Toxic/metabolic/endocrinological</td>
<td>*Inborn errors of metabolism</td>
</tr>
<tr>
<td>Other</td>
<td>*Hunger/underfeeding/malnourishment</td>
</tr>
</tbody>
</table>

*Serious or life-threatening diagnoses.
Nonaccidental Trauma And Crying
A critical diagnosis to which every clinician should be alert is nonaccidental trauma. Crying has been shown to be a risk factor for abuse as well as a manifestation of abusive injuries in infants. Emergency clinicians should be aware that a crying infant may lower a family’s threshold for nonaccidental trauma or it may be a hallmark of injury that has already been inflicted. Studies have demonstrated that infant crying induces stress, negative feelings, and thoughts of infanticide in parents. A 2004 study from the Netherlands reported that 5.6% of parents smothered, slapped, or shook their infants at least once to stop their crying. A risk factor in this study was crying that was deemed by the parents as being “excessive.” A 1992 case report describes the death of an infant secondary to abusive injuries whose crying had initially been attributed in the ED to colic, further underscoring the potential severity of missed abuse in a crying infant. Additionally, physical examination findings and injury should correlate to the patient’s age and developmental stage. Numerous studies highlight the concept that an isolated bony injury that is deemed accidental in an older infant or toddler may be the only representation of nonaccidental trauma in a younger infant. Persistent crying in an infant coupled with any concerning social factors or physical examination findings should heighten the concern for nonaccidental trauma.

Common Causes Of Crying
The largest and most relevant studies on crying in infants highlight the fact that the majority of diagnoses accounting for unexplained crying are not serious, not life-threatening, and are often treatable illnesses. In their study of 200 crying infants who presented to the ED, Fahimi et al found that the 3 most common diagnoses were colic (29.5%), acute otitis media (15.5%), and constipation (5.5%). Freedman et al and Poole reported similar diagnoses as the most common in their respective studies, including crying syndromes/colic, gastroesophageal reflux disease, viral illnesses, constipation, acute otitis media, and idiopathic crying. Calado et al examined the reasons for neonatal visits to an ED over a 1-year period, and excessive crying was the second most common reason for presentation (13.6% of patients). Most diagnoses for this group of neonates were considered to be “nonserious” (including nonapparent pathology, infant colic, and physiologic jaundice). This evidence should serve as reassurance that the most common complaints encountered in an acutely crying infant are not serious or life-threatening.

Clinical Clues To Differentiate Serious Illnesses From Less-Serious Illnesses
There are a number of features of a crying infant’s presentation on examination that can assist in differentiating serious from less-serious underlying illnesses. Following are some clinical indications that may help clarify the acuity of illness when evaluating a crying infant.

Heightened Parental Concern
Multiple studies have documented that parents can recognize their child’s cry and can distinguish between the different causes of crying (ie, hunger or fatigue versus distress). In a retrospective review conducted in 2010, Van den Bruel et al sought to identify which clinical features were predictive of serious illness in children in a variety of ambulatory care settings (including outpatient, urgent care, and ED settings). Of the variables cited, parental concern was found to be a “red flag” in identifying serious illness, with a positive likelihood ratio (LR) of 14.4 (95% confidence interval [CI], 9.3-22.1).

Heightened Clinician Concern
As with parental/caregiver concern, a higher degree of clinician concern has been shown to predict the likelihood that a patient has a more serious underlying condition. In the 2010 study by Van den Bruel et al, clinician instinct regarding severity of illness was seen as a strong “red flag” for serious disease with a positive LR of 23.5 (95% CI, 16.8-32.7). A 2012 observational study looked prospectively at clinician “gut feeling” in identifying children with serious underlying infections in the primary care setting. For children initially assessed as having a nonserious illness, a clinician’s “gut feeling” that something was wrong, despite the assessment, substantially increased the likelihood of serious illness with a LR of 25.5 (95% CI, 7.9-82). These studies suggest that clinician intuition, however formulated, plays a key role in identifying infants with serious illness.

Objective Patient Variables
In Poole’s 1991 retrospective study, 34 infants were judged to have a serious condition as a cause for their crying, and it was concluded that persistent, excessive crying in the ED beyond the time of the initial assessment was predictive of serious illness (sensitivity, 100%; specificity, 77%; and positive predictive value, 87%). As noted previously (see Etiology And Epidemiology, page 3), due to the definition of “serious illness” in that study, the inclusion of non-life-threatening diagnoses (such as herpangina, acute otitis media, and corneal abrasions) was allowed. This likely overestimated the true prevalence of serious illness, as defined for the purposes of this issue, in the crying infant patient population. However, in that study, no serious underlying illnesses were missed when a concerning physical examination was coupled with persistent crying. The study also found that if results of the physical examination were normal and the infant did not continue to cry...
beyond the time of initial assessment, serious illness was unlikely (no infants meeting these criteria had a serious illness).

In the 2009 Freedman study of 237 crying infants, unwell appearance also suggested a more serious etiology. This study also underscored a low likelihood of serious illness in crying infants in the ED; only 5.1% of the 237 infants studied had a serious or life-threatening underlying cause for their crying, as per their definition (ie, one that could potentially result in an adverse outcome if undiagnosed).

While there is no single finding to predict a more serious etiology, there are certainly parental, clinician, and patient features to guide the degree of concern and subsequently to focus the workup and further investigations of each individual patient.

**Prehospital Care**

Crying infants may present to the ED/hospital setting with emergency personnel or with family or caregivers by private vehicle, depending on the degree of concern, the infant’s level of distress, and other medical or social characteristics. If emergency personnel are called upon, they should care for these infants according to authorized stabilization protocols. These infants have the potential to harbor serious illness and should be treated accordingly, with appropriate assessment of airway, breathing, and circulation (ABCs) in addition to other interventions as deemed necessary (intravenous access and infusion of intravenous fluids, bedside glucose measurement, supplemental oxygen, etc).

Any information about the presenting episode from the caregivers and the description of the patient’s appearance and vital signs en route can be helpful for the receiving emergency clinician. Prehospital providers should be discouraged from making false reassurances to caregivers or dissuading them from seeking an ED evaluation given the possibility of serious underlying illness in these infants.

**Emergency Department Evaluation**

**History**

A detailed and thorough history is crucial to making a diagnosis or directing further workup. The history has been reported as diagnostic in 20% to 86% of cases, alone or in conjunction with physical examination findings. While the data clearly indicate the importance of conducting a systematic history, completing it can be difficult in the case of a crying infant. There will never be a true first-hand account of the event or events, as a preverbal child cannot provide information. The caregivers of a crying child may also be anxious and unable to offer a coherent and chronological description of the event(s) leading to ED presentation. Obtaining a history in high-acuity situations may be interrupted until the patient is stabilized.

Many serious and life-threatening illnesses can present with crying, and attention must be paid to the ABCs upon first patient encounter. All resuscitative and stabilization measures must be implemented prior to or during the history-taking process, which can contribute to ongoing caregiver anxiety and make a cohesive collection of information more difficult. We recommend an age-appropriate, thorough, and systematic history-taking. Key points are noted in Table 2 (see page 7).

**Physical Examination**

In a busy ED, it is both acceptable and often necessary to perform limited and focused examinations. When the range of possible etiologies is broad and potentially life-threatening for a crying infant, a more thorough and systematic physical examination is recommended. Larger retrospective studies demonstrate that the physical examination is instrumental in making a final diagnosis, contributing to diagnoses in > 50% of cases, alone or in conjunction with history or follow-up examinations. In the sections following, the most significant clinical signs and features of the physical examination are highlighted, focusing on those associated with the most common and the most serious or life-threatening diagnoses, as supported by the literature to date. (See Table 1, page 4.) An algorithm for evaluation and management of a crying infant is presented on page 9.

**Initial Impression And General Appearance**

The information obtained in the brief observational period has been shown to be both important and predictive in determining significant illness in the pediatric population. An emergency clinician’s intuition of a serious underlying etiology has been shown to be associated with a “substantially increased risk of serious illness.” The clinical features most strongly associated with a clinician’s gut feeling about a serious illness include the child’s overall response (drowsiness, no laughing) among other more system-specific findings. These findings should be taken into account when determining plans for further workup.

**Inconsolability**

A child who cannot be consoled is concerning for a more serious etiology. Persistent, excessive crying in the ED beyond the time of the initial assessment can be predictive of a serious illness and should also be taken into account when performing the physical examination and determining management of the patient.
**Head And Neck**

**Corneal Abrasions**

A number of studies and case reports have investigated the relationship between excessive crying and the presence of corneal abrasions. There have been conflicting data published regarding excessive crying that can be directly attributed to the presence of a corneal abrasion versus the incidental finding of an abrasion in a crying infant. While Poole and Harkness have published data identifying corneal abrasions as the likely cause for crying in a number of infants,\(^8\)\(^3\)\(^2\)\(^3\) larger cohort studies have not supported the identification of corneal abrasions as the lone cause of excessive crying.\(^7\)\(^1\)\(^5\) Furthermore, a study by Shope et al in 2010 found that nearly 50% of 1-month-old infants presenting to a primary care center had corneal abrasions that could be identified by fluorescein staining; however, there was no association between the presence of these abrasions and the mean length of crying time.\(^3\)\(^4\) This study cautioned primary care providers to beware of missing a more serious underlying etiology for crying in infants who are found to have abrasions that may be incidental and not causative. Therefore, in the ED, suspicion for a corneal abrasion or injury should be heightened in the presence of facial scratches, photophobia, excessive tearing, or presence of foreign bodies, and fluorescein staining should be considered in these cases.

**Acute Otitis Media**

Multiple large studies have shown acute otitis media to be one of the most commonly identified etiologies in crying infants, highlighting the importance of a thorough external ear and otoscopic examination.\(^7\)\(^8\)\(^1\)\(^5\) Please refer to the *Pediatric Emergency Medicine Practice* April 2013 issue, "An Evidence-Based Approach To Managing Acute Otitis Media" for additional information.

**Nonaccidental Trauma**

The head is one of the most commonly targeted areas of abuse in infants.\(^3\)\(^5\) One case control study of infants and toddlers in a pediatric intensive care

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**Table 2. Patient History Of Illness**

| History of present illness | • Onset, duration, frequency, and timing of crying episodes  
|                          | • Attempted interventions and outcomes  
|                          | • Associated activities/behaviors (sleep, feeding, relation to physical position, etc)  
|                          | • History of similar episodes and any prior evaluations  
| Birth history            | • Prenatal and birth history (gestational age, birth weight, etc)  
|                          | • Pregnancy and/or perinatal complications  
|                          | • Prenatal screening results  
|                          | • Substance use during pregnancy  
| Feeding/intake history*  | • If breastfeeding – frequency, difficulties, maternal medications, supplements, and diet  
|                          | • If formula-feeding - type of formula and method of preparation (mixing and temperature of water used)  
|                          | • Temporal relationship between crying and feeds  
|                          | • Any unusual signs/symptoms during feeds (diaphoresis, cyanosis, choking/gagging, emesis, etc)  
| Voiding/stool history†   | • Normal voiding/stool patterns  
|                          | • History of prior urinary tract infection or known anatomic abnormalities  
|                          | • History of prior laxative, enema, or stool softener use  
| Past medical history     | • History of prior illnesses/hospitalizations  
|                          | • Developmental milestones, growth, and weight gain  
|                          | • Current or recent medications  
|                          | • Immunization status (when possible, review specific vaccines recently given)\(^4\)  
| Family history           | • Congenital, genetic, or metabolic disorders  
| Social history           | • Home environment (stress, domestic violence, social services involvement)  
|                          | • Caregivers  
|                          | • Exposure to tobacco\(^5\), alcohol, or drugs in the home  

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*There have been multiple studies and case reports of infant discontinuation syndromes and withdrawal symptoms in infants exposed to medications via breast milk. A study by Hale et al in 2010, showed that 17% of 930 infants exposed to antidepressants in breast milk developed “inconsolable crying” and an additional 25% were described as irritable.\(^2\)\(^8\)\(^7\)\(^5\) Multiple studies have found that 2 of the more common causes of persistent crying in infants are constipation and occult urinary tract infections.\(^7\)\(^8\)\(^1\)\(^5\) Freedman et al also noted that the most common serious underlying disease was occult urinary tract infection, accounting for 25% of all serious etiologies.\(^7\)\(^8\)\(^1\)\(^5\) Persistent crying associated with painful local reactions after vaccine administration has been reported, especially with the diphtheria, tetanus, and pertussis vaccine.\(^7\)\(^9\)\(^3\)\(^0\) A Dutch study of 5845 infants aged 0 to 3 months found that infants whose parents were current heavy smokers or whose mothers had been heavy smokers during pregnancy had a 69% higher prevalence of “excessive crying” than infants of nonsmoking parents (rates: 6.3% and 3.7%, respectively; odds ratio, 1.8; 95% confidence interval, 1.26-2.57).\(^3\)\(^1\)
unit found that characteristics predictive of abuse included bruising on the ear or neck in a child aged ≤ 4 years and bruising in any region for an infant aged < 4 months. Additionally, injuries to the oral frenula are concerning for nonaccidental trauma and are considered pathognomonic for abusive injury in younger (nonmobile) infants. Presence of frenula trauma should prompt evaluation of the head, skeletal system, and visceral system for occult trauma.

Oropharyngeal Pathologies
While oropharyngeal pathologies are less common causes of excessive crying, retropharyngeal cellulitis has been identified as a cause of crying in an infant. Additionally, trismus or torticollis in an infant should raise concern for peritonsillar abscess, deep neck space infections, tetany, or dystonia (ie, secondary to an ingestion).

Thorax
Clavicular Fractures
In a neonate, identified clavicular injuries may have occurred during delivery and tend to be midclavicular fractures. Typically, there is a history of difficult delivery, shoulder dystocia, or fetal macrosomia (large for gestational age). Clavicular fractures identified in nonambulatory infants outside of the neonatal period (in the setting of a history without risk factors for birth trauma) should raise the concern for nonaccidental trauma.

Vertebral Osteomyelitis And Discitis
Vertebral and disc pathologies are less common causes of excessive crying; however, certain studies have found that these pathologies can have nonspecific findings in infants and toddlers and may present with crying and irritability with or without refusal to walk. There may be localized tenderness to palpation over the affected areas or decreased range of motion of the spine due to pain.

Rib Fractures
Rib fractures have been identified as a cause of crying in infants and should raise suspicion for nonaccidental trauma. On examination, these may be identified as bony step-offs or crepitus over the affected area. A 2010 review of injuries indicative of child abuse noted that rib fractures have a very high specificity for abuse (probability of abuse of 71%, 95% CI, 42%-91%). While there can be rib fractures in the presence of birth trauma, metabolic bone disease, or cardiopulmonary resuscitation, these are quite rare causes.

Mastitis
Breast tissue, especially in neonates, should be examined for possible breast mass, abscess, or cellulitis. A 2001 case report cited infantile mastitis as the cause of unexplained infant crying.

Heart And Cardiovascular System
Arrhythmias
In Poole’s 1991 study, 2 of 56 infants presenting with crying were found to have supraventricular tachycardia. A 2007 review article noted that the diagnosis of supraventricular tachycardia is often made in triage when a nurse reports a heart rate that is “too fast to count,” or a heart rate that is documented at > 220 beats/min.

Congenital Heart Disease And Heart Failure
Infants with congenital heart disease may present with irritability and crying, as they may have trouble with feeding, etc. There may be cardiopulmonary abnormalities in addition to hepatosplenomegaly. There have been case reports of infants with anomalous left coronary arteries that present with nonspecific signs (such as crying and fussiness), including a report of a 12-week-old infant who presented with a chief complaint of paroxysms of irritability and was found to have anomalous left coronary artery originating from the pulmonary artery.

Abdomen
Constipation
Multiple large studies have shown constipation to be one of the most common causes of infant crying. This diagnosis can often be made by history and careful palpation of the abdomen. Like many components of the physical examination in a crying baby, all maneuvers considered more “invasive” (such as a digital rectal examination) should be tailored to the individual patient. While larger studies do not support the routine use of digital rectal exam as a diagnostic test in the evaluation of a crying infant, smaller studies have found the digital rectal exam to be contributory to a final diagnosis in this group of patients. Emergency clinicians may consider including a digital rectal exam if indicated by clinical suspicion.

Hirschsprung Disease
This etiology should be considered in infants with a suggestive history, especially with constipation and an empty rectal vault on digital rectal exam.

Pyloric Stenosis
A 2012 case report presented a 9-week-old infant with an atypical presentation of pyloric stenosis that consisted of poor feeding and fussiness alone. An abdominal mass may not be palpable in an infant with pyloric stenosis, as evidenced by a 2004 retrospective review of 70 infants who underwent pyloromyotomy for pyloric stenosis, and in whom only 50% had a palpable mass. However, if
Clinical Pathway For Evaluation Of Acute Unexplained Crying In Infants

Perform initial evaluation of ABCs; any clinically unstable patient should be stabilized before proceeding.

Clinically stable by vital signs and mental status for age?

YES

NO

Fever of > 38°C or hypothermia of < 35°C?

YES

NO

History or examination findings to identify a source of illness or injury?

YES

NO

Able to determine a differential diagnosis?

YES

NO

- Consider ancillary tests to confirm or rule out diagnoses (ie, laboratory tests, imaging)
- Consider screening UA in infants aged < 1 month (Class II)
- Treat as indicated by presumed diagnosis
- Admit versus discharge (refer to Table 3, Disposition Criteria For Crying Infants, page 13)

Refer to the American Academy of Pediatrics Practice Guidelines for Febrile Infants (Class II)

- Apply cardiorespiratory monitor (Class II)
- Obtain IV access and consider 10-20 mL/kg normal saline bolus (Class II)
- Consider checking bedside blood glucose (Class II)
- Provide supplemental oxygen and/or respiratory support as needed (Class II)
- Provide blood pressure support with IV fluids and/or pressors as needed (Class II)
- Consider admission/transfer to PICU as needed (Class II)
- Continue workup after initial stabilization

TOXIC or ill-appearing?

YES

NO

Easily consolable or stops crying spontaneously?

YES

NO

- Observe and perform serial examinations
- Consider ancillary tests as needed or indicated by repeat examinations
- Admit versus discharge (refer to Table 3, Disposition Criteria For Crying Infants, page 13)

Abbreviations: ABCs, airway, breathing, and circulation; IV, intravenous; PICU, pediatric intensive care unit; UA, urinalysis.

Class Of Evidence Definitions

Each action in the clinical pathway section of Pediatric Emergency Medicine Practice receives a score based on the following definitions.

Class I
- Always acceptable, safe
- Definitely useful
- Proven in both efficacy and effectiveness

Level of Evidence:
- One or more large prospective studies are present (with rare exceptions)
- High-quality meta-analyses
- Study results consistently positive and compelling

Class II
- Safe, acceptable
- Possibly useful
- Generally higher levels of evidence

Level of Evidence:
- Non-randomized or retrospective studies: historic, cohort, or case control studies
- Less robust randomized controlled trials
- Results consistently positive

Class III
- May be acceptable
- Considered optional or alternative treatments

Level of Evidence:
- Case series, animal studies, consensus panels
- Occasionally positive results

Indeterminate
- Continuing area of research
- No recommendations until further research

Level of Evidence:
- Evidence not available
- Higher studies in progress
- Results inconsistent, contradictory
- Results not compelling

This clinical pathway is intended to supplement, rather than substitute for, professional judgment and may be changed depending upon a patient’s individual needs. Failure to comply with this pathway does not represent a breach of the standard of care.

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palpable, a mass tends to be most readily identified after an episode of emesis and is most often found in the right upper quadrant.

**Malrotation With Volvulus**
This serious pathology can present with nonspecific findings of irritability/crying and abdominal pain with later development of bilious emesis and bloody stools. Emergency clinicians should consider further investigation in an ill-appearing infant with these signs or a nonreassuring abdominal examination.

**Intussusception**
A retrospective chart review by Eshel et al of 97 patients with intussusception found that, while vomiting (with or without other signs and symptoms) was the most common clinical presentation of intussusception, 74% of children with intussusception initially presented with crying episodes. The index of suspicion should be high in an infant who presents with waves of crying and/or apparent abdominal pain who may also have vomiting and/or bloody stools, lethargy, or intermittent flexing of the lower extremities. A mass may or may not be present on examination, particularly if the intussuscepted bowel has already self-reduced prior to abdominal examination.

**Genitourinary System**

**Occult Urinary Tract Infection**
Uncircumcised males are at higher risk for UTI, and multiple large studies have found that occult UTI may present with cry and fussiness in the absence of fever or other obvious urinary symptoms.

**Inguinal Hernias**
A 2006 study reported that when inguinal hernias are present at birth, the risk of the hernia becoming incarcerated within the first 6 months of life may be as high as 60%. Consider transillumination of an enlarged scrotum to differentiate between hydrocele and other causes of scrotal swelling. Also consider ultrasound imaging with Doppler flow and obtaining urinalysis studies if the diagnosis is unclear based on physical examination findings alone.

**Extremities**

**Septic Arthritis**
Septic arthritis in neonates and young infants is a relatively rare phenomenon; however, case reports have been published on neonates with septic joints who presented with crying, particularly with diaper changes. Any evidence of reproducible pain with movement of a joint, swelling, or erythema over a joint should prompt further investigation.

**Fractures**
Fractures have been identified as a common presentation of abuse, and in infants aged < 1 year, abuse accounts for up to 80% of fractures. Emergency clinicians should have a high index of suspicion for abusive injuries whenever a suspected fracture is found on examination, particularly with nonambulatory infants.

**Nervous System**

**Hypoglycemia/Nervous Irritability**
Hypoglycemia in infants can have a variety of presenting signs, including jitteriness, abnormal or high-pitched cry, irritability, poor feeding, and seizures. In older infants, hypoglycemia can be indicative of an inborn error of metabolism, infection/sepsis, pituitary or adrenal dysfunction, or inadequate nutritional intake. In these suspected cases, a thorough genitourinary examination should be performed to assess for any anatomic abnormalities that may be associated with adrenal or other hormonal disturbances (such as congenital adrenal hyperplasia). A bedside glucose measurement is an easy and minimally invasive test that can provide a vastly important piece of information, especially in younger infants who have lower glycogen stores and lower physiologic reserve.

**Central Nervous System Infections**
Irritability can be the presenting sign of a serious underlying infection (including meningitis and encephalitis) prior to development of a fever. If there are no focal findings to suggest a central nervous system infection, but the infant is ill-appearing or has inconsolable crying throughout the history and physical examination, prolonged monitoring and/or admission with repeat vital signs and reexaminations should be considered, as more localizing signs may develop over serial examinations.

**Occult Head Injury**
A 1999 prospective study of 608 children aged < 2 years who presented to the ED with head trauma found that 30% of the children with identified intracranial injuries had irritability with or without other focal signs. Rubin et al reviewed 65 cases of children aged < 2 years who presented to an urban children’s hospital with “high-risk” injuries, including rib fractures, multiple fractures, and facial injuries. Over one-third of these children had an occult head injury (37.3%, 95% CI, 24.2-50.4) identified on head imaging. This study highlights the importance of considering head imaging to identify occult head injury in high-risk children.

**Skin**

**Ecchymoses**
Nonaccidental trauma can be a cause of crying, and evidence of these injuries is often manifested as new or old lesions on the skin of an infant or young child. Full exposure of the infant during physical examination is paramount to identifying these physical signs. A cross-sectional survey evaluating bruising...
patterns in 973 children aged < 36 months presenting for routine well-child checks revealed that only 0.6% of children aged < 6 months had any bruises, whereas 17.8% of cruisers and 51.9% of walkers had bruises. Furthermore, the study found that the most frequent sites of bruises were over the anterior tibia and knee as well as on the forehead and upper legs of walkers. Conversely, bruises on the face and trunk were rare and bruises on the hands and buttocks were not observed at any age. Accidental bruises tend to be localized to bony prominences in mobile children. Therefore, location of the bruises should be considered when assessing the infant for nonaccidental trauma.

**Burns**

Patterned burns in the shape of hot objects (such as cigarettes) or immersion of a body part or area into a hot liquid are most consistent with inflicted (rather than accidental) injuries. In a 2004 case series by Daria et al, it was reported that burns to the bilateral lower extremities, buttocks, and perineum are more likely to represent in an inflicted injury rather than an accidental burn. A review by Maguire found that the majority of accidental burns are scald burns, which are generally “pull-over” scalds, occurring when a child pulls over a container of hot fluid. These burns tend to affect the face, upper limbs, anterior trunk, and/or the neck, are usually asymmetric, and have an irregular edge and irregular burn depth. Circumferential burns or “stocking/glove” burns are very concerning for immersion injuries. Any concerning patterns of injury on examination should always prompt consultation with social services and/or child protection services.

**Diagnostic Studies**

There is a wide array of testing that could be performed on a crying infant due to the breadth of diagnostic possibilities for underlying etiologies. Given the fear of “missing something” in an infant, emergency clinicians may overevaluate these patients with unnecessary laboratory and imaging studies. There are no algorithms or practice guidelines devoted specifically to this topic, which makes evaluation of these infants challenging, yet it underscores the importance of a thoughtful and individualized workup. The best diagnostic strategy is one that is evidence-based, tailored to each patient, and clinically effective, with attention paid to time and healthcare costs. The elements of an ED evaluation that meet these criteria are presented below, highlighting high-yield versus low-yield testing in the ED setting.

**Laboratory Testing**

The most helpful laboratory test, from a screening perspective, is a urinalysis and urine culture to assess for an occult UTI, especially in very young infants. The prevalence of this serious bacterial infection in infancy and its potential morbidity if left undiagnosed or untreated contribute to the strength of urinalysis as a screening test. In Freedman’s infant cohort study, all of the occult UTIs occurred in infants aged < 4 months, with the highest incidence in infants aged < 1 month. This age range should serve as a guideline to providers as to which infants may benefit from urine testing as part of their initial diagnostic workup.

No other laboratory test has been put forth as a universal screening tool for infants. We caution against a “kitchen sink” approach to laboratory testing in this population, as it is low yield. The evidence does not support its routine use, invasive testing is stressful to patients and caregivers, and it is not a cost-effective approach to patient care in the ED. Laboratory testing should be tailored to concerns raised individually by the history and physical examination.

**Imaging**

There are no recommendations for routine use of imaging of any kind (radiography, ultrasound, etc) for screening purposes. Similar to laboratory testing, imaging studies should be considered individually for each patient based on indications from the history and physical examination. Given the established and evolving body of literature documenting the longitudinal oncologic risks from ionizing radiation in pediatric patients, we strongly recommend carefully weighing the risks and benefits of an irradiating examination in the infant population. If nonirradiating studies (ie, ultrasound, magnetic resonance imaging) are available, these may be appropriate first-line imaging studies for this population, if imaging is deemed necessary.

**Serial Examinations**

If the initial history and physical examination are not revealing, and/or if initial testing is not indicated or is not informative, a period of observation in the ED may be useful in determining an eventual diagnosis. This allows other accompanying features to manifest (ie, fever, signs of acute abdominal conditions), allows the emergency clinician time to observe the infant’s behaviors and crying pattern, and may guide the use of additional diagnostic tests and disposition planning. There is no defined number of hours cited in the literature to observe a crying infant. Each emergency clinician must decide the appropriate number of hours to observe and re-examine an infant such that the child may be safely discharged or admitted to the hospital for continued crying or ongoing concerns.
Follow-Up As A Key To Diagnosis
Close follow-up is critical for crying infants evaluated in the ED. For infants with treatable or identifiable causes, follow-up ensures a second visit to document improvement with instituted treatments or for caregiver reassurance. For infants whose crying remains unexplained at the completion of the ED evaluation, close follow-up serves as a second point in time that a cause for crying may be determined. Poole et al found that a final diagnosis was made on a follow-up visit in 39% of patients.8

Treatment

Treatment of a crying infant in the ED falls into 2 categories: (1) infants with recognizable, treatable illnesses, and (2) infants who continue to cry without a clear, identifiable cause, but who need formal discharge instructions or “treatment” guidelines from emergency clinicians.

Treatment for identifiable causes will depend on the nature of the underlying complaint which will be further qualified by the need for inpatient or outpatient therapy based on both the clinical diagnosis and other factors that contribute to disposition planning.

The more difficult treatment plan is for the infant who continues to cry without an identifiable cause. For the subset of these infants who meet criteria for admission to the hospital, treatment will hinge upon further observation and examinations and is not reliant on the ED personnel, at that point. Infants who are crying without an identifiable cause who meet outpatient treatment or discharge criteria require a treatment plan from emergency clinicians at the time of discharge. It is difficult to standardize a treatment plan for crying, given the myriad of presentations and possible underlying causes. The following elements of an ED discharge plan are recommended for a crying infant and may help to reassure and empower caregivers with emphasis on the importance of follow-up and being aware of more serious symptoms for which to seek care:

- **Outpatient follow-up within 24 hours**: If an underlying etiology is unclear, there may be lingering parental or clinician concern about an evolving diagnosis. If there is significant concern from one or both parties, the infant should not be discharged until the diagnosis is clear or concerns are assuaged. If all parties are reassured in the ED, a next-day appointment gives both parents and clinicians a definitive next step in evaluation of the infant. Outpatient follow-up for crying infants has been instrumental in uncovering previously unclear diagnoses and should be part of the ongoing treatment plan.
- **Avoidance of medicating the unknown or unclear**: Medicating an infant without a known underlying illness may mitigate the symptoms of an evolving illness and delay diagnosis or definitive treatment. Nonstandardized or unapproved therapies may also have unknown negative side-effect profiles.

- **Reassurance**: After a period of observation and individualized testing in the ED without a clear diagnosis, sometimes the only real “treatment” that can be offered for a crying infant is reassurance to the caregiver that the more concerning organic pathology has been ruled out. For a caregiver for whom reassurance is not effective, consultation with social services or further observation in the ED should be considered. A caregiver who is not reassured or remains too distressed may not be able to care for an infant at home or appropriately comply with discharge instructions.

- **Supportive measures**: Caregivers should be attentive to the basic needs of their infant (such as hunger, fatigue, diaper changes) at home to ensure that these needs are being met and not contributing to ongoing periods of crying. Emergency clinicians should also discuss soothing techniques with caregivers.

- **Clear reasons to return for emergency care**: Caregivers should have a low threshold to seek care for their infant if there is ongoing concern. Detailed and age-appropriate instructions should be reviewed with the caregiver for reasons to return to the ED (including fever in infants aged < 3 months, true irritability or inconsolability, inability to eat or drink, or an inability of the caregiver to contend with the stress of caring for the crying infant/ feeling overwhelmed, or any new or concerning symptoms).

Special Circumstances

Crying Without A Clear Cause: Crying, Colic, And Concerned Parents

The mandate of the emergency clinician is to consider those rare but serious diagnoses in every patient, knowing that, for the majority of patients, common illnesses will be most prevalent. Of the infants who present to the ED with a chief complaint of crying, the majority will not have significant underlying disease. The challenge to the emergency clinician is that once underlying disease is ruled out, there may not be a diagnosis to make in the case of the crying infant. The crying itself may be a manifestation of a normal range of crying behavior, not necessitating a diagnosis, but a discussion with caregivers on crying norms, soothing patterns, resources, and ongoing management at home. Emergency clinicians can play a pivotal role in educating families, destigmatizing crying behaviors, and helping to reduce parental anxiety during infancy.
which is an already stressful period of time.

Colic, a term familiar to many clinicians and caregivers, has typically been viewed as a syndrome distinct from normal crying patterns. This may be due to the fact that the presentation of the most extreme cases are seen in the clinical setting, such that continuity with normative crying behaviors is not observed by emergency clinicians and is, therefore, characterized as discrete behavior. Colic has historically been defined as paroxysms of excessive crying lasting > 3 hours per day, occurring > 3 days in any week for 3 weeks, in an otherwise healthy baby aged 2 weeks to 4 months. It is estimated to affect 10% to 30% of infants worldwide. Compared to what is considered normal developmental crying, the crying of colic has been shown to be more difficult to stop or console. Proposed causes include cow’s milk protein allergy or intolerance, gastrointestinal reflux disease, feeding difficulties, sleep difficulties, and neurodevelopmental immaturity. While the term “colic” may be clinically applicable to some infants, the term itself may connote to families that something is “wrong” with the baby, the parenting, or the baby-parent interaction, which can lead to more distress.

Whether or not colic is indeed its own diagnosis, or just a point on the spectrum of normal infant crying behaviors, crying without a “cause” will likely be distressing to parents no matter what term is applied. Emergency clinicians should take the strategy of reassurance, education, empowerment, and provision of resources for the caregivers of a crying infant, including close post-ED follow-up.

**Disposition**

There are no evidence-based guidelines to direct disposition of the infant who presents to the ED with acute unexplained crying. As with other chief complaints, disposition will largely be affected by the workup in the ED. Again, a period of observation time in the ED is advocated to help guide disposition planning (ie, admission versus discharge to home). General criteria for admission and discharge of a crying infant are presented in Table 3.

It is easiest to assign disposition to the extremes of any clinical spectrum, including crying as a chief complaint. Any toxic, unstable, or critically ill infant should be admitted to a general inpatient or intensive care unit setting, regardless of diagnosis. The converse is true for the very well-appearing infant, one who is stable, with a nonfocal history and physical examination, who is no longer crying, and whose diagnosis is clear and amenable to outpatient therapy or whose diagnosis is unclear but not concerning, and can be followed up promptly.

The “gray area” infants are the hardest to disposition. These are the infants who continue to cry or remain inconsolable without a clear-cut diagnosis. For these infants, a dedicated period of observation in the ED is recommended to allow for serial examination, additional observation, and appropriate testing or whose diagnosis is unclear but not concerning, and can be followed up promptly.

The “gray area” infants are the hardest to disposition. These are the infants who continue to cry or remain inconsolable without a clear-cut diagnosis. For these infants, a dedicated period of observation in the ED is recommended to allow for serial examination, additional observation, and appropriate testing.

**Table 3. Disposition Criteria For Crying Infants**

<table>
<thead>
<tr>
<th>Criteria For Admission</th>
<th>Criteria For Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Toxic-appearing</td>
<td>• Well-appearing/consoled</td>
</tr>
<tr>
<td>• Hemodynamically unstable</td>
<td>• Clinically stable with a condition treatable in outpatient therapy (oral antibiotics, analgesics)</td>
</tr>
<tr>
<td>• Critical illness</td>
<td>• Access to immediate follow-up care</td>
</tr>
<tr>
<td>• Clinically stable with a condition requiring IV therapy (fluids, antibiotics)</td>
<td>• Resolution of crying in the ED or ongoing crying that is baseline or not concerning to provider or caregiver</td>
</tr>
<tr>
<td>• No access to immediate follow-up care</td>
<td>• No social concerns</td>
</tr>
<tr>
<td>• Ongoing crying without a clear-cut etiology after examination, observation, and appropriate testing</td>
<td>Parents are comfortable with discharge plan and understand next steps regarding treatment and follow-up</td>
</tr>
<tr>
<td>• Social concerns (poor support at home, unsafe environment for the infant, risk factors for abuse or neglect)</td>
<td></td>
</tr>
<tr>
<td>• Failure to meet discharge criteria</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: ED, emergency department; IV, intravenous.
1. “The baby did not have a fever, so I did not consider that he could have a serious infection.”
   Sepsis and other significant infections can present as crying, alone or in conjunction with other findings. An infant may not manifest a fever as a sign of infection or, conversely, he may be hypothermic as a manifestation of infection. For a crying infant, all serious etiologies, including infection, should be considered and investigated when appropriate, with or without the presence of fever.

2. “Of course the baby had an elevated heart rate; he was crying.”
   Crying can often lead to tachycardia in infants. However, tachycardia can be a manifestation of infection, dehydration, evolving fever, pain, or distress. Vital signs should be taken repeatedly on a crying infant, in both the crying and noncrying state, to avoid inappropriately attributing abnormal findings to crying rather than other potentially serious underlying causes.

3. “I had a bad feeling about this baby, but how I feel shouldn’t impact my investigations.”
   As with parental concern, clinician concern and “gut instinct” regarding pediatric pathology has been supported as an accurate tool in determining serious illness. Emergency clinicians should acknowledge their concern and factor their intuition into an evaluation of a crying infant.

4. “The parents seem really nice, so there is no need to consider nonaccidental trauma.”
   Unfortunately, it is almost impossible to predict which caregivers may cause nonaccidental trauma. It must be considered in any infant with persistent or unexplained crying regardless of a family’s stature or protestations.

5. “All babies cry. This is a normal finding and is nothing to worry about.”
   While some amount of crying is normal in all infants, any crying that exceeds the duration or quality of the infant’s typical crying, is concerning to parents or providers, or is accompanied by a change in behavior should be considered significant and potentially pathologic until proven otherwise. The spectrum of normal crying for an infant is variable by age and by individual infant, so caregiver descriptions of deviations should be taken seriously.

6. “If I am not going to perform any diagnostic tests (such as blood, urine, imaging), I should just send this baby home. There is no reason for him to sit around in the ED.”
   Observation and serial examinations are paramount to the evaluation of a crying infant for whom a diagnosis is not immediately clear. This may allow for the acquisition of additional information to guide further ED testing, allow for clinicians and caregivers to follow a trajectory of illness in the ED, and provide relief for stressed caregivers and time for education.

7. “The more tests I perform, the closer I will be to making a diagnosis.”
   There is no one test or series of tests universally recommended for the evaluation of a crying infant. History and physical examination remain the cornerstone of diagnosis in crying infants. “Kitchen sink” testing is expensive, invasive, and inappropriate for most infants who present to the ED with acute unexplained crying.

8. “This baby just has colic.”
   Colic and unexplained crying are common diagnoses, but should only be applied to infants for whom other etiologies for acute crying have been considered first.

9. “This baby seems fine; there is no need for this family to follow up with their primary care provider.”
   Close follow-up is critical for crying infants evaluated in the ED. First, it ensures a second visit to document improvement or worsening for diagnosed conditions in which treatment may have been instituted. Second, it allows an additional diagnostic examination for infants in whom the ED visit was unrevealing and in whom an illness may now be more apparent. Lastly, it ensures a session with the primary care provider, someone who can provide reassurance and support to the family on a more long-term basis.

10. “Parents are always anxious about their babies, but it doesn’t mean anything is truly wrong with the infant.”
    The degree of parental concern has been shown to correlate with disease severity in infants. Parents can differentiate the cries of their infants and can intuit pathology, as well. Parental concern should be one of multiple features to factor into the evaluation of a crying infant and should not be dismissed by providers.
Summary

Crying is a common reason that caregivers seek medical attention for infants and it is distressing for both caregivers and emergency clinicians. There is a broad array of diagnostic possibilities for crying infants, from the serious and life-threatening to the benign. Emergency clinicians should be aware of the clinical variables that can help distinguish among this spectrum of clinical diagnoses. The most important elements of the ED evaluation with the highest diagnostic yield are the history and physical examination. While there are no universally recommended laboratory or imaging tests for a crying infant, urinalysis is recommended in young infants to evaluate for an occult UTI presenting as acute unexplained crying. While colic and unexplained crying are more common than serious underlying pathologies, they are diagnoses that should be made after consideration and/or evaluation of other possible causes of crying. Infants who have an unrevealing history or physical examination but who continue to cry should be observed in the ED with serial examinations. Continued crying should prompt ongoing dedicated evaluation and consideration of admission to the hospital. If a crying infant does not have a clear-cut diagnosis from the ED evaluation, emergency clinicians should take the time to reassure, educate, empower, and provide resources for caregivers to encourage good care and follow-up. The disposition of crying infants from the ED is multifactorial and must include consideration of medical, social, and follow-up factors.

Case Conclusions

You decided to observe Joseph for a longer period of time, and you initiated additional testing based on the degree of his parents’ concern and due to the risk of occult UTIs in afebrile crying infants. You obtained a catheterized urine specimen, and the urinalysis was positive for nitrates and 50 to 100 white blood cells per high-power field. Because of the evidence for an occult UTI on urinalysis, you obtained a CBC with differential and blood culture. The CBC was reassuring and the infant remained well-appearing throughout the ED visit. Given his well appearance, lack of fever, tolerance of feeds, and assured appropriate follow-up, you decided that he was a candidate for outpatient therapy. He was given a dose of intramuscular ceftriaxone and observed to tolerate 2 bottles and make an additional wet diaper. You discharged him home with a course of oral antibiotics and instructions to follow up with his pediatrician the next day.

You returned to the other room again to reexamine Melissa systematically from head to toe. On this repeat examination, you noticed some subtle swelling over the right proximal tibia, and palpation over this area resulted in reproducible high-pitched crying. Due to concern for a possible fracture, you told the mother that you would order an x-ray to look at her lower leg as the first step in your evaluation. A right lower extremity x-ray was obtained and revealed an acute “bucket handle” (metaphyseal) fracture of the proximal tibia. Knowing that this fracture raises suspicion for nonaccidental trauma, you spent additional time speaking with Melissa’s mother. She eventually stated that 1 day ago, she had pulled and twisted the baby’s right leg during a crying episode while the infant was strapped into a changing table. She denied any other episodes of this kind. You involved social services and child protection in this case. The baby was admitted to the hospital for further treatment and to provide social support for the family.

References

Evidence-based medicine requires a critical appraisal of the literature based upon study methodology and number of subjects. Not all references are equally robust. The findings of a large, prospective, randomized, and blinded trial should carry more weight than a case report.

To help the reader judge the strength of each reference, pertinent information about the study will be included in bold type following the reference, where available. In addition, the most informative references cited in this paper, as determined by the authors, will be noted by an asterisk (*) next to the number of the reference.

8.* Poole SR. The infant with acute, unexplained, excessive crying. Pediatrics. 1991;88(3):450-455. (Retrospective study; 56 infants)


CME Questions

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1. Which of the following poses the greatest challenge in performing and interpreting studies on acute, unexplained, and excessive crying in infants?
   a. Rarity of crying as a chief complaint
   b. Lack of a uniform definition of “excessive” crying
   c. Difficulty in obtaining consent for testing in the ED
   d. Epidemiologic changes due to immunizations

2. Approximately what percentage of infants presenting to the ED with acute, unexplained crying have a serious or life-threatening diagnosis, according to the most recent literature?
   a. < 1%
   b. 5%
   c. 25%
   d. 60%

3. What finding in the ED would heighten concern for a more serious underlying etiology in a crying infant?
   a. Night-time versus daytime presentation
   b. An infant who continues to cry beyond the time of the initial assessment
   c. An infant who stops crying in the ED
   d. Previous diagnosis of colic made after extensive outpatient testing

4. Which elements of the medical evaluation have been shown to be most useful in making a diagnosis in an acutely crying infant?
   a. Stool guaiac testing
   b. Urine testing
   c. History and physical examination
   d. Abdominal x-ray
5. One of the most common etiologies for infant crying is:
   a. Sepsis
   b. Supraventricular tachycardia
   c. Nonaccidental trauma
   d. Constipation

6. Which of the following laboratory tests has been most commonly recommended as an appropriate test for an afebrile, acutely crying infant, especially younger infants?
   a. Serum glucose
   b. Urinalysis and urine culture
   c. CBC
   d. Serum electrolytes

7. Before being discharged to home, caregivers of a now well-appearing or less-concerning infant should be able to ensure the following for their infant:
   a. Primary care provider/medical follow-up within 24 hours
   b. Primary care provider/medical follow-up within 72 hours
   c. Primary care provider/medical follow-up within 1 week
   d. Hospital admission

8. The young parents of a crying baby tell you they are overwhelmed at home with the care of their infant. After an ED evaluation, the infant appears well without a clear-cut etiology for the crying, but is now well-consoled. The parents remain distressed and overwhelmed. The appropriate disposition for this infant is:
   a. Discharge to home with reassurance
   b. Discharge to home without scheduled follow-up
   c. Discharge to home with follow-up in the next week
   d. Consultation with social services, reassurance and support with thoughtful disposition planning, and arrangement of follow-up care within 24 hours

9. Colic or unexplained crying as a diagnosis in the ED can be made:
   a. If no other clear-cut cause for crying is uncovered
   b. After appropriate consideration of other etiologies for crying and parental history confirms a pattern of crying consistent with standard definitions for the term “colic”
   c. If a baby has already been diagnosed with colic or the parents describe the baby as colicky
   d. If the baby is crying and aged < 3 months

10. For an infant who continues to cry in the ED without a clear-cut diagnosis, ED evaluation should include:
    a. Automatic admission to the hospital
    b. Discharge to home with follow-up only as needed
    c. Continued observation, serial examinations, and further testing as indicated
    d. Comprehensive laboratory work and imaging until a diagnosis is clear

In upcoming issues of Pediatric Emergency Medicine Practice:

"Diagnosis and Treatment Of Pediatric Urinary Tract Infections." In this issue, pertinent history and physical examination findings as well as recommended diagnostic and treatment modalities for urinary tract infection (which differ, depending on the patient’s age group) will be discussed. Novel concepts, special circumstances, and disposition of the pediatric patient with a urinary tract infection will also be discussed.

"Managing The Apparent Life-Threatening Event in Pediatric Patients." This issue will (1) summarize the recent literature on apparent life-threatening events (ALTE); (2) guide the emergency clinician on risk factors that may place a patient with ALTE at higher risk for having a serious underlying disease and/or a future adverse event requiring intervention; and (3) describe guidelines for diagnostic testing and admission to the hospital for infants with ALTE.
In the *Pediatric Emergency Medicine Practice* 2012 Audio Series, Dr. Andrew Sloas reviews 4 critical pediatric topics and provides evidence-based treatment recommendations.

**PRODUCT DETAILS:**
- Evidence-based reviews on 4 critical pediatric patient presentations
- Convenient format: MP3 download of all 4 topics instantly after you order
- Speaker: Dr. Andrew Sloas
- Recording date: December 17, 2012

**TOPIC #1: Evaluation And Treatment Of Croup**
This audio session will refresh your knowledge for the diagnosis and treatment of croup and introduce you to some new concepts, so you can avoid potential airway disasters. **Length:** 19 minutes

**TOPIC #2: Pediatric Procedural Sedation**
This audio review will expand your familiarity with multiple sedation medications, including new drugs, along with the more traditionally accepted therapies. You'll learn what medication choices are available and which techniques will increase your sedation safety profile. **Length:** 23 minutes

**TOPIC #3: Acute Appendicitis In Childhood**
This audio session examines the clinical manifestations of appendicitis that can vary from the nonspecific to the typically expected and covers special diagnostic dilemmas for pediatric patients. Detailed history-taking and appropriate laboratory testing are also discussed as a guide for evaluating the pediatric patient. **Length:** 22 minutes

**TOPIC #4: Ovarian And Adnexal Torsion In Children**
This audio review will give you an evidence-based approach to ovarian and adnexal torsion, so you'll know how to combine all tools available to you (history, physical examination, and ancillary testing) to correctly identify this disease. **Length:** 17 minutes

To learn more, visit [www.ebmedicine.net/PEMPaudio](http://www.ebmedicine.net/PEMPaudio)

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Target Audience: This enduring material is designed for emergency medicine physicians, physician assistants, nurse practitioners, and residents.

Goals: Upon completion of this activity, you should be able to: (1) demonstrate medical decision-making based on the strongest clinical evidence; (2) cost-effectively diagnose and treat the most critical ED presentations; and (3) describe the most common medicolegal pitfalls for each topic covered.

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